

## **CHAPTER A-7**

### **ENERGY ANALYSES, ECONOMIC ANALYSES, CONTROL SYSTEMS, EMCS**

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## CHAPTER A-7

### ENERGY ANALYSES, ECONOMIC ANALYSES, CONTROL SYSTEMS, EMCS

**7.1 GENERAL.** As stated by Public Law 100-615, it is United States policy that the Federal Government has the opportunity and responsibility to develop, demonstrate, and promote energy conservation, solar heating, solar cooling, and renewable energy sources in Federal buildings.

**7.1.1 Analyses.** Terminology, acronyms, abbreviations, and symbology shall be defined. Document all calculations, data, methods, and conclusions. Technical analyses shall be performed using approved methods.

**7.1.2 Site Adaptations.** Requirements given in this chapter apply equally to new designs, major renovations and adaptations of previous designs. Designers may have to modify previous designs in order to bring the design into accord with current criteria. All pertinent analyses must be submitted for adaptations of previous designs unless specifically exempted by the Government. Previous design analyses for solar applications, energy budget (EB), conservation methods, life cycle cost analysis, (LCCA) and energy system simulations may be submitted, in lieu of a new analysis, for cases where the following conditions are fully satisfied.

- a. The Designer reviews and verifies the previous analysis.
- b. Climate, siting and orientation must be equivalent.
- c. Design factors impacting analyses must be equivalent.
- d. Alternatives being studied must be equivalent.
- e. Previous analysis methods meet current requirements.

**7.1.3 Changes During Design.** All significant changes and their impacts shall have applicable analyses (EB, LCCA) revised and resubmitted, regardless of when or how the change occurs during the project. Note well that changes may necessitate revised economic and Engineering analyses.

**7.2 APPLICABLE PUBLICATIONS.** The most current editions of the publications listed below constitute an addendum to this chapter.

**7.2.1 Air Force.** The following are applicable only to Air Force projects.

AF ETL 94-4            Energy Usage Criteria for Facilities in the Military Construction Program

MIL-HDBK 1190    Facility Planning and Design Guide

**7.2.2 Army Projects.** The following are applicable only to Army projects.

TI 800-01            Technical Instructions, Design Criteria

7.2.3 All Projects. The following apply for all Military construction.

CEGS-13814 Building Preparation for Energy Monitoring and Control Systems (EMCS)

CEGS-15950 HVAC Control Systems

CEGS-15951 Direct Digital Control for HVAC

AF ETL 83-1 Design of HVAC Control Systems

HNDSP-83-049-ED-ME EMCS Cost Estimating Guidelines

NBS Handbook 135LCC Manual - Federal Energy Program

TM 5-785 Engineering Weather Data

TM 5-802-1 Economic Studies for Military Construction Design - Applications

TM 5-810-1 Mechanical Design Heating, Ventilating, and Air Conditioning

TM 5-815-2/AFM 88-36 Energy Monitoring and Control System (EMCS)

TI 810-11 Heating, Ventilating, and Air Conditioning (HVAC) Control Systems

**7.3 PRECONCEPT SUBMITTAL REQUIREMENTS.** Unless otherwise stated, the following items shall be submitted prior to the Concept Design Submittal.

7.3.1 HVAC Alternatives Coordination. Before commencing analysis of HVAC systems, contact CESASEN-DM for approval of selected alternatives. Submit written confirmation of approvals documenting alternatives considered, persons contacted, basis of alternatives chosen, alternatives approved, and date.

7.3.2 Modeling Input Data. Preconcept submittal of modeling data is only required when called for in the design instructions. When required, submit the following items to CESASEN-DM for review prior to computer modeling runs.

a. Two copies of all modeling input data.

b. Single line rough layout sketches (8½ inches x 11 inches - Not to Scale), for each alternative, in sufficient detail to show zoning, approximate pipe and such lengths, and quantities for major components.

**7.4 CODE 3 DESIGN REQUIREMENTS.** To be furnished with specific instructions to contract or delivery order.

#### **7.5 CONCEPT/EARLY PRELIMINARY (35 PERCENT) DESIGN SUBMITTAL**

**REQUIREMENTS.** Unless otherwise specified, the following items shall be submitted at Concept. See paragraph 7.8, TECHNICAL REQUIREMENTS for instructions on methods and content.

- a. Printouts of I/O data for DEU and LCC simulations.
- b. U-value calculations for exterior surfaces.
- c. DEU breakdown for each building.
- d. Life Cycle Cost Analysis, including approval of alternatives which are to be studied.
- e. Energy conservation methods report.
- f. List of specs to be used.
- g. I/O data diskette (when required).

**7.6 PRELIMINARY (60 PERCENT) DESIGN SUBMITTAL REQUIREMENTS.** No submittal required.

**7.7 FINAL (100 PERCENT) DESIGN SUBMITTAL REQUIREMENTS.** The following items shall be submitted for review. See paragraph 7.8, TECHNICAL REQUIREMENTS for instructions on methods and content.

- a. HVAC controls drawings (shown on C-plates) and specs.
- b. Final EMCS plans and specs (when required).
- c. Annotated responses to all review comments.
- d. Revised design energy usage calcs and report for any significant changes.

**7.8 CORRECTED FINAL DESIGN SUBMITTAL REQUIREMENTS.** The following items shall be submitted for review.

- a. HVAC controls drawings and specs with final comments incorporated.
- b. Annotated responses to all review comments.

**7.9 REQUIREMENTS FOR DESIGN/BUILD RFP PACKAGES.** To be furnished with specific instructions to the contract or delivery order.

**7.10 TECHNICAL REQUIREMENTS.** This section prescribes detailed procedures, acceptable methods and minimum content requirements for studies, analyses, and designs. Unless otherwise specified, all applicable studies shall be required for all new building design projects, major additions to existing buildings, and major renovations of existing buildings or energy systems.

**7.10.1 Life Cycle Cost Analyses.** Unless otherwise authorized, constant dollar methods given in TM 5-802-1 and NBS Handbook 135 shall be used. Analyses shall be based on actual expected operating conditions, energy usage and costs. Selections of major systems and equipment must be supported by economic analyses except in the following situations. Major systems include all HVAC systems unless stated otherwise.

- a. There are no reasonable alternatives for comparison.

- b. A waiver has been approved exempting the requirement.
- c. The cost of the analysis is greater than any potential benefit.

7.10.1.1 Cost Estimates. Economic analyses must include cost estimates.

7.10.1.2 Computer Analyses. Computerized analyses shall be made using the program LCCID available from CERL. Programs other than LCCID must be certified by HQUSACE CEMP-E as the equivalent thereof. Before using any computer program, make sure that it is updated with the most current discount factors published in the periodic supplement to NBS Handbook 135.

7.10.1.3 Site Energy Costs. When purchased energy is used, analyses shall be based on site energy usage and the actual cost of energy at the site. Purchased energy is energy for which the site is billed at a rate which includes all applicable costs (e.g. fuel costs, operating costs, generating losses, distribution losses, profit, taxes).

7.10.1.4 Source Energy Costs. When generated energy is used, analyses should be based on the systems source fuel input, fuel costs, and efficiencies. Generated energy is energy for which the Government operates or controls the generation and distribution system.

7.10.1.5 Rules. The overriding factor in selections shall be the mission function of the Customer. Alternatives must meet the functional requirements. Selections between alternatives shall be for systems with the lowest Total LCC and a design energy usage no greater than the Energy Use Budget. In the case of alternatives with equivalent LCC see chapter 2, para 2.2 of TM 5-802-1.

7.10.2 U-Values. Exterior surfaces of thermally controlled spaces shall be in accordance with the following criteria.

Army	TI 800-01 Technical Instructions, Design Criteria
Army Medical	MIL-HDBK-1191, DOD Medical and Dental Treatment Facilities Design and Construction Criteria
Air Force	AF ETL 94-4, Energy Usage Criteria for Facilities in the Military Construction Program

Submit U-value calculations for exterior surfaces of conditioned buildings to include typical walls, floor, roof, and gross (weighted average) walls.

7.10.3 Energy Use Budget (EUB) Compliance Check. The building's design energy usage (DEU) shall be submitted for each new building and each building with major renovation involving energy systems or exterior surfaces. The DEU shall be based on all loads except process loads. Hours of operation shall be the standard schedules given in the following sources. For hours outside the hours of operation, area lights and HVAC equipment shall be scheduled "off." It shall be verified that the DEU is within the EUB.

Army	TI 800-01 Technical Instructions, Design Criteria.
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Air Force                      ETL 94-4, Energy Usage Criteria for Facilities in the  
Military Construction Program

7.10.3.1 Energy Use Budget (EUB). Energy use budgets given in the following sources are the maximum allowable standardized energy usage rates. However, it is intended that designers use good judgement, standard practice and specified criteria to optimize energy systems based on lowest LCC.

Army                              TI 800-01 Technical Instructions, Design Criteria

Air Force                      ETL 94-4, Energy Usage Criteria for Facilities in the  
Military Construction Program

7.10.3.2 Conversion Factors. Energy use or savings shall be calculated using the following factors. These conversion factors are given by 10 CFR, Part 436. Equipment efficiencies and system losses must be accounted for in calculations. For energy media not listed here, use current standard Engineering data or other approved reference data.

ENERGY MEDIUM FACTORS	CONVERSION FACTORS	METRIC CONVERSION FACTORS
Electricity - Purchased	3,413 Btu/kWh	3.6 million joules/kilowatt hour
Electricity - Generated	11,600 source Btu/site kWh	12.2 million joules (source)/KWH (site)
Steam - Purchased/Generated	1,000 Btu/lb	2.3 million joules/kilogram
Natural Gas	1,031 Btu/cf	38.4 million joules/liter
LPG, Propane, Butane	95,500 Btu/gal	26.6 million joules/liter
No. 2 Oil - Distillate	138,700 Btu/gal	38.7 million joules/liter
No. 5/6 Oil - Residual	149,700 Btu/gal	41.7 million joules/liter
Coal - Bituminous	24.6 million Btu/short ton	28.6 million joules/kilogram
Coal - Anthracite	28.4 million Btu/short ton	33 million joules/kilogram
Water - other than steam	use energy value at site boundary	

7.10.3.3 Site/Source. DEU shall be based on site energy usage, except as stated below. Site energy usage is defined as usage occurring within an imaginary 5-foot boundary line around the building.

a. Energy crossing the boundary shall be measured or accounted for at the boundary with proper credit given for usable returned energy (steam, chilled water, high temp water, etc.).

b. When equipment or systems located outside the boundary (e.g. chillers, condensers, transformers, central plants, cooling towers) serve less than five buildings, prorate their energy usage among the buildings served and include it in EB2 and EB3 as appropriate.

c. Distribution losses beyond the boundary shall not be included in the EB, excepting that such losses from equipment or systems serving less than five buildings shall be prorated among the buildings served and included in the EB.

7.10.3.4 Gross Area. The DEU shall be based on building gross area. Gross area is defined as the sum of all floor areas including basements, cellars, mezzanines, other intermediate floor tiers and penthouses. All measurements shall be from the exterior wall of the building or from the center line of party walls.

7.10.3.5 Hot Water (HW). For DEU, compute nonprocess HW usage as follows.

$$Q = N \times A \times D \times (T_o - T_i) \times 8.33$$

Q = HW energy usage in Btu	D = Days of HW consumption
N = Number of people served daily	T <sub>o</sub> = Outlet Water Temp (F)*
A = Gallons per person **	T <sub>i</sub> = Inlet Water Temp (F)

\*\*\*\*\*  
\*

THE FOLLOWING IS THE SAME FORMULA IN S.I. METRIC UNITS

\*\*\*\*\*  
\*

$$Q = N \times A \times D \times (T_o - T_i) \times 9.24 \text{ Metric Units}$$

Q = HW energy usage in Watts/h	D = Days of HW consumption
N = Number of people served daily	T <sub>o</sub> = Outlet Water Temp (C)*
A = Liters per person **	T <sub>i</sub> = Inlet Water Temp (C)

\* See ASHRAE 1991 Handbook, HVAC Applications, Chapter 44, Table 3

\*\* See ASHRAE 1991 Handbook, HVAC Applications, Chapter 44, Table 7

7.10.3.6 Process Energy. The items listed below are considered processes. People are not process loads and should be included in the analysis. HVAC required in direct support of a process is considered part of the process. Interior lighting is not considered a process.

- a. All nonreal property.
- b. Installed equipment (e.g. refrigerated merchandise cases).
- c. User equipment (e.g. typewriter, copier, computer).
- d. Industrial equipment.
- e. Training systems.
- f. Hot water for gyms, cafeterias, and commissaries.
- g. Specialized ventilation systems required by OSHA.
- h. Exterior perimeter lighting.

7.10.4 Solar Energy. Public Law requires that designers consider solar feasibility and include cost effective applications in new construction and major renovations of Federal Buildings.



7.10.4.1 Active Solar. According to the Generic Active Solar Feasibility Study for CONUS, active solar hot water heating systems are not feasible for DOE region 3, which includes Georgia, South Carolina and North Carolina.

7.10.5 Energy Conservation. It is the policy of the Federal Government to develop, demonstrate, and promote the use of energy conservation methods in Public buildings. The designer shall incorporate energy conservation features where possible. Listed below are general examples of conservation methods. This list is not all inclusive and is not intended to limit ingenuity.

- a. Energy recovery.
- b. Loading dock seals.
- c. Air destratification.
- d. Minimal HVAC of stairwells.
- e. Point of use, on demand type water heaters.
- f. Integrated AC-lighting system (return air troffer).
- g. Optimized thermal envelopes (e.g. ducts, pipes, equipment).
- h. Economizer cycles (except for Hunter AAF, Ft. Stewart and Moody AFB).

7.10.5.1 Energy Conservation Reports. For conservation methods with an investment cost exceeding 1.00 percent of the PA, a report shall be submitted with supporting economic analyses. The report shall list the conservation features to be included in the project. The report shall include the following.

- a. Title of conservation method.
- b. Investment cost.
- c. Net energy savings.
- d. Net LCC savings (only for items exceeding 1.00 percent).
- e. Simple payback (only for items exceeding 1.00 percent).
- f. SIR (only for items exceeding 1.00 percent of PA).
- g. Evaluation method.
- h. All pertinent backup data.

7.10.6 Nonsolar Energy Systems. A minimum of three alternatives shall be studied for each significant energy using system and subsystem. Significant energy usage includes:

- a. Any annual energy cost exceeding \$15,000.
- b. Any usage which exceeds 25 percent of the energy target.
- c. All HVAC systems are considered significant energy users.

7.10.6.1 Systems Other Than HVAC. Study requirements for systems other than HVAC will be issued upon request through Project Managers.

7.10.6.2 HVAC Systems. All HVAC systems are considered significant energy users until proven otherwise. Study of HVAC system alternatives is required. Alternatives must be coordinated with and approved by CESASEN-DM.

7.10.6.3 HVAC System Analysis. Any Army facility that is heated and/or cooled or heated only and exceeds 280 m<sup>2</sup> (3,000 ft<sup>2</sup>) of gross floor area will be analyzed with a computer program that uses established weather data files and performs 8,760 hourly calculations. Energy calculations for buildings that do not require a computer simulation may use a computer program or appropriate methods explained in the 1989 ASHRAE Fundamentals Handbook, Chapter 28. When typical buildings are analyzed and the results applied to similar facilities, the building area used in selecting appropriate methods shall be the total gross area of all similar buildings and the typical building combined. Printouts of pertinent I/O data must be submitted as backup for DEU and LCC runs. Unless BLAST is used, an IBM DOS or MS DOS compatible diskette containing the I/O data must also be submitted.

7.10.7 Major Renovation. Major renovation is defined as changes in the features of the building envelope and replacement of the lighting, HVAC and water heating systems. When instructions for projects state that the project involves major renovation Energy Budget, Active Solar, and Life Cycle Cost analyses will be required.

7.10.8 Energy Conservation Investment Program (ECIP). This article's instructions only apply to projects designated as ECIP funded. Validations and revalidations shall be done as specified in the Energy Conservation Investment Program (ECIP) guidance. If revalidation shows a project or a portion of a project does not meet current ECIP criteria, then designers must provide a full explanation of the reasons including discussion of significant differences between the original validation and the revalidation. All other pertinent requirements given in this chapter apply to ECIP projects, unless stated otherwise by specific instructions.

7.10.9 Energy Engineering Analysis Program (EEAP). Scope of work requirements for EEAP studies are provided on a case by case basis. No other requirements given in this chapter apply to EEAP studies unless specifically so stated in the EEAP Scope of Work.

7.10.10 HVAC Controls. HVAC control system designs shall be in accordance with the guidance presented in TI 810-11. Designs for HVAC control systems shall be for electronic controls, not to include DDC unless designated in the individual project specific instructions. Pneumatic actuators are acceptable but pneumatic controls are not allowed without specific approval.

7.10.10.1 Drawings.

7.10.10.1.1 Single Loop Digital Control (SLDC) Drawings. Savannah District has produced detailed control drawings for air handling systems which shall be used without modification for any reason other than a site specific condition. These drawings are available in CADD form and are located on the SAS\_STD CD as well as the WES CADD Library web site. The CADD formats available are limited to Intergraph and Autocad. Detail designs will be required for system for which drawings are not available. The HVAC control plates (MC-plates) include:

- a. Schematics.
- b. Ladder diagrams.

- c. Equipment schedule (updated with job specific data).
- d. Control panel details.

7.10.10.1.2 Direct Digital Control (DDC) Drawings. Savannah District has produced detailed control drawings for air handling systems which shall be used without modification for any reason other than a site specific condition. These drawings are available in CADD form and are located on the SAS\_Std CD as well as the WES CADD Library web site. The CADD formats available are limited to Intergraph and AutoCAD. Detail designs will be required for system for which drawings are not available. The HVAC control plates (MC-plates) include:

- a. Schematics.
- b. Ladder diagrams.
- c. Data terminal strip.
- d. I/O summary table.
- e. Equipment schedule (updated with job specific data).
- f. Sequence of operation.

DDC controls shall only be used when specifically called for in the individual project specific instructions.

#### 7.10.10.2 Specifications.

Internet address for CEGS specifications <http://www.hnd.usace.army.mil/techinfo/>

7.10.10.3 Control Panel Locations. Reserve clear wall and floor space for each HVAC control panel. Verify clearances required for adequate maintenance access are satisfied.

7.10.11 Energy Monitoring and Control Systems (EMCS). New building designs and major renovations of buildings, HVAC systems, or HVAC controls shall include provisions for EMCS. Exceptions may be made for certain small, remote buildings. All exceptions must be approved by CESASEN-DM. Army TM 5-815-2 shall be used for guidance. EMCS cost estimates shall be in accordance with HNDSP-83-049-ED-ME.

- a. Drawings. Plans will include the following.
  - 1. I/O summaries (address points) and hardware.
  - 2. Data terminal cabinet (DTC).
  - 3. Space allocation adjacent to the DTC for an FCL.
  - 4. 110-volt duplex wall outlet adjacent to FCL.
  - 5. Conduit and wiring from DTC to each utility meter.
  - 6. Utility Meters - Gas meters shall be of the pulsing type or of the type which can be adapted to a future EMCS by the addition of a pulsing device. Refer to CHAPTER A-5 for electric meters.
  - 7. Future Cabinet Locations (FCL). In mechanical rooms reserve clear wall space 3 ft wide with enough clearance (see NEC Article 110) for an 457 mm (18-inch) deep EMCS cabinet to be placed in the future.

b. Specifications. Prepare specs using CEGS 13814 BUILDING PREPARATION FOR ENERGY MONITORING AND CONTROL SYSTEMS (EMCS) or incorporate applicable portions of 13814 into section CEGS 15950 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) CONTROL SYSTEMS.

c. Failure Logic. Design controls such that in an EMCS failure local loop control function either continues or fails to the desired mode.

## **7.11 GLOSSARY OF TERMS AND ABBREVIATIONS.**

AABC	American Air Balance Council
AC	Air Conditioning (or cooling)
AFF	Above finished floor
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration and AC Engineers
ASME	American Society of Mechanical Engineers
BLAST	Building Loads Analysis and System Thermodynamics
Btu	British thermal unit
C	Celsius
CDD	Cooling Degree Day method
CEGS	Corps of Engineers Guide Specifications
CERL	Construction Engineering Research Laboratory
cf	cubic feet
CFR	Code of Federal Regulations
CWE	Current work estimate
DDC	Direct Digital Control
DoD	Department of Defense
DoE	Department of Energy
DOS	Disk Operating System (e.g. IBM or Microsoft)
EB	Energy Budget
EMCS	Energy Monitoring and Control System
ETL	Engineering Technical Letter
F	Fahrenheit
FCL	Future Cabinet Location (EMCS)
FID	Field Interface Device
g	gram
h	hour
HDD	Heating Degree Day method
hp	horsepower
HVAC	Heating, Ventilating, and/or Air Conditioning
I/O	Input/Output
J	Joule
k	kilo = 1,000
LCC	Life Cycle Cost
LCCID	Life Cycle Cost In Design (by CERL)
m	meter
M	Mega = 1,000,000
MILCON	Military Construction

Mux	Multiplexer
NBS	National Bureau of Standards
NCEL	Naval Construction Engineering Laboratory
NEBB	National Environment Balancing Bureau
NEC	National Electrical Code
NTIS	National Technical Information Service
SIR	Savings Investment Ratio
SPW	Single Present Worth
UPW	Uniform Present Worth
UPW*	Modified UPW

**7.12 REFERENCES.** The following were used as guidance in preparing this chapter. Unless otherwise specified, they do not constitute an addendum.

TI        Design Criteria

AF ETL 84-7        MPC Energy Conservation Investment Program

AF ETL 86-2        Energy Management and Control Systems

TM 5-802-1        Economic Studies for Military Construction Design - Applications

Army Reg 11-27    Army Energy Program

Army Reg 11-28    Economic Analysis

Public Law 100-615 Federal Energy Management Improvement Act of 1988

10 CFR, Part 436    Energy

## CHAPTER A-7

### ENERGY ANALYSES, ECONOMIC ANALYSES, CONTROL SYSTEMS, EMCS

#### EXHIBITS

A-7-1      GENERAL CHECKLIST FOR ENERGY ANALYSIS

A-7-2      DESIGN ENERGY USAGE SUMMARY

## GENERAL CHECKLIST FOR ENERGY ANALYSIS

PROJECT: \_\_\_\_\_  
SITE: \_\_\_\_\_  
LI: \_\_\_\_\_  
FY: \_\_\_\_\_  
CN: \_\_\_\_\_  
DESIGNER: \_\_\_\_\_  
CHECKER: \_\_\_\_\_  
DATE: \_\_\_\_\_

### A. PRECONCEPT PHASE.

\_\_\_\_\_ If previous designs are being site adapted, then previous analyses must be verified as acceptable for submission or new analyses must be made. In any case a complete design analysis must be made for all projects.

\_\_\_\_\_ Coordinate energy system alternatives before beginning detailed studies.

\_\_\_\_\_ When required submit modeling data prior to modeling runs.

### B. CONCEPT DESIGN PHASE.

\_\_\_\_\_ Are U-value calc provided and are any deviations from criteria justified based on a LCCA?

\_\_\_\_\_ Are Energy Budgets complete and submitted for each unique building?

\_\_\_\_\_ Are Active Solar Analyses complete and submitted for each building?

\_\_\_\_\_ Have all energy modeling I/O data been submitted?

\_\_\_\_\_ Have all analyses been checked for accuracy and completeness?

### C. PRELIMINARY DESIGN PHASE.

\_\_\_\_\_ Have any significant changes occurred since Concept? If yes, then have all applicable analyses been revised and resubmitted?

\_\_\_\_\_ Have all technical comments been resolved satisfactorily?

\_\_\_\_\_ Have any Value Engineering proposals been incorporated into the design? If yes, then have all applicable analyses been revised and resubmitted?

### D. FINAL DESIGN PHASE.

\_\_\_\_\_ Have any significant changes occurred since Concept? If yes, then have all applicable analyses been revised and resubmitted?

\_\_\_\_\_ Have all technical comments been resolved satisfactorily?

\_\_\_\_\_ Have any Value Engineering proposals been incorporated into the design? If yes, then have all applicable analyses been revised and resubmitted?

\_\_\_\_\_ Are U-values listed in the architectural specs in accordance with analyses?

\_\_\_\_\_ Are control plans and specs complete?

\_\_\_\_\_ Are EMCS plans and specs complete?

\_\_\_\_\_ Is the final design analysis complete?

\_\_\_\_\_ Have all listed submittal items been submitted?



DESIGN ENERGY USAGE SUMMARY

PROJECT: \_\_\_\_\_  
BASE: \_\_\_\_\_  
LI: \_\_\_\_\_ FY: \_\_\_\_\_





DOE REGION: \_\_\_\_\_ BUILDING: \_\_\_\_\_

CATEGORY CODE/FACILITY TYPE: \_\_\_\_\_

APPROXIMATE GROSS FLOOR AREA: \_\_\_\_\_

FLOOR AREA (heated and cooled): \_\_\_\_\_

FLOOR AREA (heated only): \_\_\_\_\_

HVAC SYSTEM DESCRIPTION: Describe all systems and energy sources

ENERGY USE BUDGET: \_\_\_\_\_ Btu/sf/yr

STANDARD SCHEDULE: \_\_\_\_\_

DESIGN ENERGY USAGE: \_\_\_\_\_ Btu/sf/yr

Heating \_\_\_\_\_ Btu/sf/yr

Cooling \_\_\_\_\_ Btu/sf/yr

Lighting \_\_\_\_\_ Btu/sf/yr

Ventilation \_\_\_\_\_ Btu/sf/yr

Domestic HW \_\_\_\_\_ Btu/sf/yr

PERCENT DEVIATION FROM GOAL: \_\_\_\_\_

EXPLANATION FOR DEVIATING FROM ENERGY GOAL: